

PATENT SPECIFICATION



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COMPLETE SPECIFICATION

Improvements in or relating to Blast Furnaces

We, GESELLSCHAFT FÜR LINDE'S EISMASCHINEN AG., a German Company, of Hellbrüggskreuth, near Munich, Germany, do hereby declare the nature 5 of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:

The invention relates to the operation 10 of blast furnaces for the production of pig iron, fused cement, or the like. In particular it has to do with methods of supplying such furnaces with oxygen-enriched blast, and apparatus therefor.

The use of oxygen-enriched blast has 15 previously been suggested for the production of hot-flowing types of pig iron in a blast furnace or for the elimination of hanging disturbances and to obtain other advantages.

The object of the present invention is to correct one-sided descent of the charge in shaft furnaces, in particular blast furnaces.

The process according to the invention 25 is characterized by the fact that a blast with increased oxygen concentration is fed to that part of the furnace in which the charge does not descend with difficulty.

With this new method of operation it is possible to introduce relatively high oxygen concentrations at those points where the charge descends with difficulty, or does not descend smoothly, thus appreciably increasing the smelting capacity 30 at such points and in this manner smelting out local accumulations of material in the furnace. The method of the present invention thus offers the possibility of avoiding any irregularities in the charge in the furnace which heretofore was attainable neither with fuel nor with enriched blast.

An additional advantage of the new method consists in that the quite appreciable oxygen losses, which occur through leaks in the blast tuyeres or in the bustle pipes and the like of the blast furnace, are avoided. The process can also be applied to the correction of one-sided descent of the

In the drawings F represents a furnace wall, other parts being identified as they 55 are mentioned.

As shown in Fig. 1, high purity oxygen or an oxygen-enriched gas produced in an air separation plant, or from any convenient source, may be supplied from a 60 header pipe (not shown) surrounding the furnace to separate conduits or pipes 11 which severally lead to the individual blast tuyeres 13 located at intervals circumferentially of the furnace. The 65 oxygen or oxygen-enriched mixture, in a volume controllable by a valve 12 in each pipe 11, flows through a conduit 15 in the water jacket 14 of a blast tuyere 13, and thence through the inner wall of 70 the blast tuyere into the hot blast being discharged through the tuyere into the furnace.

A somewhat different method of carrying out the process is illustrated in Fig. 75 2. In this variant the oxygen or oxygen-enriched gas is conducted to approximately the center of the tuyere mouth by means of a conduit 16 extending from the inner wall of the blast tuyere. The conduit 16 is preferably made of ceramic material, or in the event it is made of iron, it is protected by means of heat-insulating material from the heat of the hot blast in order to prevent the conduit 80 from burning, located to such an extent that it will burn off in the oxygen stream.

In accordance with the new method of the invention, to improve regulating possibilities the oxygen or the oxygen-enriched gas of higher oxygen content than air preferably is supplied in a cold or unheated state to the individual tuyeres in addition to previous methods wherein oxygen-enriched 90 blast was applied to the tuyeres. With former methods of operation, it has been economical to produce in the air separation plant a gas mixture containing approximately 45% 95 oxygen and use this mixture for enriching the blast. With the method of the present invention it is more desirable to

order to increase the volume of gas discharged in a cold or reduced state into the furnace. Inasmuch as the blast heaters, due to the separate introduction 5 of unheated or cold oxygen to the tuyeres in accordance with the invention, need only heat the blast air, it becomes possible to heat the air in the blast heaters to a temperature higher than was 10 possible with previous methods of operation, and thereby offset the cooling effect of the colder oxygen.

Although the invention has been described in terms of a preferred embodiment wherein oxygen-enrichment of the blast is accomplished directly at the individual tuyeres, it will be evident that in applying the process of the invention 15 to metallurgical operations in general, the blast-enriching oxygen may, if desired, be introduced into individual tuyere blast pipes, 17 without departing from the scope of the invention.

Having now particularly described and 20 ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. Process for correcting one-sided 25 descent of the charge in shaft furnaces, in particular blast furnaces, characterised by the fact that a blast with increased oxygen concentration is fed to that part of the furnace in which the 30 charge descends with difficulty.

2. Process according to claim 1, char-

acterised by the fact that the oxygen is fed separately to each individual blast tuyere of the shaft furnace and is mixed with the blast air in a regulatable manner 35 only when it reaches there.

3. Process according to claim 1, characterised by the fact that the oxygen is admixed with highly heated blast air in the blast tuyere as cold high purity 40 oxygen.

4. Blast tuyere when used for carrying out the process according to claim 1, wherein the feed pipe for the oxygen is passed 45 through the water jacket, characterised by the fact that the feed pipe is extended to the inner wall of the blast tuyere and/or into the centre of the blowing cross-section.

5. Process for correcting one-sided descent of the charge in shaft furnaces, substantially as hereinbefore described, with reference to the accompanying drawings.

6. Blast tuyere when used for carrying out the process according to claim 5, constructed and adapted to operate substantially as hereinbefore described with reference to the accompanying drawing.

Dated this 6th day of December, 1935

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This Drawing is a full size reproduction of the Original.

Fig. 1

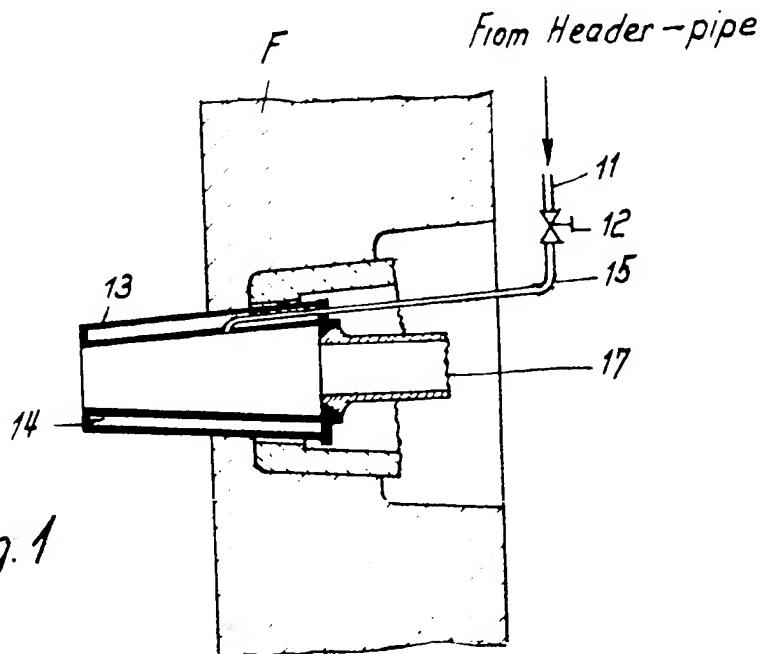


Fig. 2

